

The Chicken-leg Effect

When you jump out of bed after a night's sleep, two interesting things happen. Quite a lot of blood rushes down to your legs. And, even stranger than this, you actually begin to get shorter. Both these effects are caused by the pull of Earth's gravity.

To understand what is happening with your blood, take a sausage-shaped balloon, fill it with water, and lay it on a table. Now pick up the balloon at the knotted end. Gravity will force the water downwards, giving the balloon a bottom-heavy, bulging shape. A similar thing happens to your body when you get out of bed. When you're lying down, about 80 percent of the blood from your legs is redistributed to the upper part of your body. (In adults, this is about 1 litre of blood out of an average body's total of 5 litres, so the change is very great.) Some of this blood goes to your head and a little to your arms, but most of it ends up in your chest.

Your heart can beat more slowly because you're in a relaxed position and don't have to hold yourself upright. Also, when you stand up, your heart and other muscles have to work harder to keep blood circulating. Otherwise, it would gravitate down into your legs and feet. (Note that the blood in your arteries is red and rich in oxygen. The blood in your veins is bluish and low in oxygen.)

by Bill O'Brien
Illustrations by Ali Teo

Try a simple experiment. Before getting up in the morning, find your pulse by lightly holding the index and middle finger of one hand against your neck, just under the bend in your jaw. Count the beats for 15 seconds and multiply the number by 4 to work out how many beats there are per minute. Note this number. Then get out of bed and take your pulse again while standing. How many extra beats are there in the first minute?

The longer someone stays in bed, the greater the change in their heart rate when they eventually stand up. If you lay in bed for 2 weeks, your heart rate would almost double when you first stood up.

To overcome the force of gravity when standing, leg muscles help the heart by contracting in order to put pressure on veins and force the blood back up towards your heart and lungs. Otherwise, it would pool in your legs and feet. Some veins have non-return valves that allow blood to flow in one direction only. These help to efficiently move blood upwards.

